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(71) Applicant: **Océ-Technologies B.V.**
5914 CC Venlo (NL)

(72) Inventors:
- **Deen, Jurek Nikolaj**
  5912 JA Venlo (NL)
- **van Vliembergen, Eduardus Josephus Willibrordus**
  5924 AX Venlo (NL)
- **Geelen, Johannes Franciscus Maria Elisabeth**
  5991 AV Baarlo (NL)

(74) Representative:
Hanneman, Henri W., Dr.
Océ-Technologies B.V.
Patents & Information
St. Urbanusweg 43
P.O. Box 101
5900 MA Venlo (NL)

(54) Digital reproduction apparatus and method having a local mode and a remote mode

(57) A combined digital reproduction apparatus suitable for making prints in response to operation of keys on its operating panel (e.g. copies of documents scanned with a scanner) and making prints on its own initiative (prints in accordance with a digital print file received from a network).

In this apparatus, a user present at the apparatus for an order is given priority.

The control process of the apparatus for this purpose executes any print orders arriving via the network only if it does not detect any signs indicative of the fact that a user is preparing or executing a reproduction process at the apparatus. Such signs may, for example, be in the form of actuation of a key on the operating panel or the actual execution of a copying order.

If the control process detects such signs, it does not start the print orders received via the network.

If the control process does not detect such signs, it announces the print order first for a predetermined time, e.g. by a message on the operating panel display screen, before starting the actual printing process. On detecting activity by an operator at the apparatus, the printing process is cancelled and the control process is again exclusively responsive to orders from the operating panel.

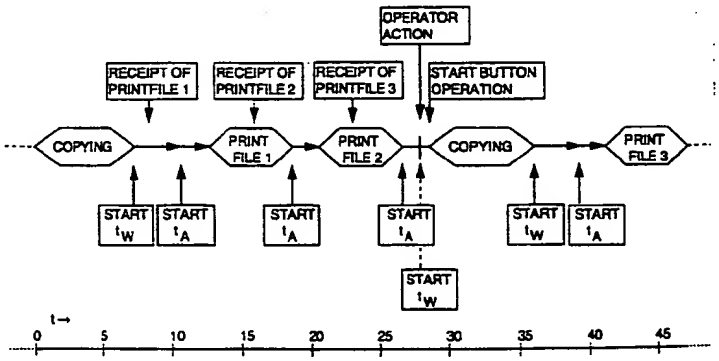

FIG. 7

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Description

The invention relates to a method of controlling a digital reproduction apparatus adapted to make prints, in accordance with digital image data, on image supports, such as sheets of paper, either in a command-controlled mode in which the apparatus starts a reproduction process in response to a start command given with the aid of operating means present on the apparatus, or an autonomous mode in which the apparatus starts a reproduction process on its own initiative, the autonomous mode being automatically set in dependence on a print order received from a digital environment.

The invention also relates to an apparatus in which the method according to the invention is implemented.

A method and apparatus of this kind are known from applicants' European patent application No. 0 689 157. This describes an apparatus adapted inter alia to receive print orders via a network and print them directly. In addition, the apparatus can make a copy of a document by scanning it by means of the scanner and make a print on the basis of the digital image data generated from the scanning operation. In addition, the apparatus can simply store a print order in a memory and hold up its printing until the print order has been selected by a user with the aid of the operating elements on the apparatus operating panel and a print command using the start key. The latter is referred to hereinafter as "postponed printing".

There are therefore orders which are started by a user at the machine himself (in this case copying and postponed print orders) and orders which are given from a distance, e.g. from a workstation (PC) (in this case a print order).

For a user who has gone to the machine in order to start an order there using the keys, it is quite frustrating when a remote-started (print) order starts just before he wants to start his order. He then has to wait until this remote order is completed before he can make his copy. This occurs frequently in practice, particularly on a machine in frequent use, and is annoying and holds up the work.

GB-A 2 284 319 discloses a copier/printer in which the execution of a print order is followed by a "printer hold time period" (PHTP) in which no new print order can be loaded in order to give a walk-up user who wants to make a copy the opportunity to do so without being hindered by a new upcoming print order.

Although inserting a PHTP after execution of a print order may give some relief to a user who wishes to make a copy, it has several drawbacks as well. First, a waiting period during which the apparatus is exclusively available for copy orders is only meaningful when there is a copy user present. There is no reason to believe that such be the case just after a print job has been executed. Second, when there are no copy users present, the PHTPs slow down the apparatus unnecessarily when there are many print orders waiting. The position of the PHTP in the time schedule therefore seems to be ill-chosen.

In addition, the same document discloses showing a message on the screen of the operating panel, during the loading of a print order, indicating the loading, and an operator who is just preparing to execute a copy job may take precedence by using the interrupt facility of the apparatus. However, loading of a print order usually takes very little time and so the operator has to react quite fast to get his precedence, if ever he notices the message. Therefore, the operator may still be taken by surprise by a remote print order. Also, working in an interrupt mode often has limited functionality and tends to rush the operator, which does not add to his comfort.

The object of the present invention is to provide an apparatus according to the preamble, in which an operator who has walked up to the apparatus to execute a copy order or postponed print order is not disturbed by suddenly upcoming remote print orders. This object is met by the improvement, that, when the autonomous mode is set for carrying out a received print order, first a predetermined announcement time is awaited, during which announcement time

- an announcement is given, in a manner which can be recognised by the physical environment of the apparatus, that the said print order is to be carried out, and
- in response to one or more specific physical interactions between an operator and the apparatus the apparatus is returned to the command-controlled mode,

and the print order is actually carried out only after expiry of the said announcement time.

As a result, when the apparatus switches itself into the autonomous mode for a print order, it remains, for a predetermined time, responsive to copying and postponed print orders. A user arriving at the machine at that time to make a copy knows that the machine will soon start printing a print order in the autonomous mode, but that he can, by quickly starting his copying order, postpone the print order and request priority for his own order. The machine will now of course first deal with the operators order.

The announcement time must be long enough for an operator to react without hurrying him. Practical values are from one 1 to 10 seconds, it being understood that the announcement time is equal for all print orders.

Particularly, said specific physical interactions include any machine-detectable interaction related to the execution of a reproduction process in the command-controlled mode, except one or more predetermined specific physical interactions. Examples of such interactions switching the apparatus to the command-controlled mode are: the pushing if a key on the operating panel, the placing of one or more original documents on an input tray or opening the door of the copy paper stock unit. Also, there may be some specific inter-

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action be excluded, because they are used for controlling events in the autonomous mode, which will be discussed later.

A convenient form of announcement is one in which use is made of the display screen on the machine operating panel, preferably with details of the identity of the impending print order.

To achieve a further improvement of the user's position with the apparatus, when one or more of the above-defined physical interactions between an operator and the apparatus are detected, the apparatus is brought into the command-controlled mode and is kept therein for a predetermined first waiting time.

This offers the user at the machine the possibility of creating time for himself to start his order at leisure by some action, e.g. by actuating a key or by placing one or more documents in the machine feed tray. The autonomous mode cannot be set during this waiting time.

When an operator action is detected (which action may be the depressing of a key on the operating panel, the placing of an original document on the input tray, or even a complete copy action), there is a good chance that the operator is there to execute a(nother) copy order or postponed print order, and therefore the apparatus according to the invention takes measures to prevent that suddenly upcoming remote print orders disturb the operator. These measures have the form of starting a waiting time during which the apparatus is exclusively available for command-controlled orders. If there is no evidence of an operator being present, there should not be time lost by holding up remote print orders, and this is, indeed, achieved by the present invention.

Another embodiment of the apparatus according to the invention is characterised in that after expiry of the execution of a reproduction process in the command-controlled mode the apparatus is kept in the command-controlled mode for a predetermined second waiting time.

As a result, on completion of a copying order, the apparatus remains for some time in the copying mode and if the user wishes to complete further copying orders he will not be overtaken by a print order. Even during this second waiting time the apparatus cannot be switched to the autonomous mode. The second waiting time may be equal to the first. A practical value for the waiting times would be between 30 seconds and 2 minutes.

Summarizing, during the announcement of a remote print order, the apparatus is already in the autonomous mode, but remains for a pretermined time susceptible for signals to return to the command-controlled mode, while during a waiting time the apparatus is in the command-controlled mode and cannot switch over to the autonomous mode.

Even without the print order announcement mechanism during an announcement period the user at the machine can be advantaged by the said waiting time mechanisms. In fact, this is a special case of the announcement time, i.e. an announcement time having the value zero.

The announcement time for a print order can differ according to what has taken place directly prior to that print order, e.g. it can be shorter between two successive print orders and longer directly after an action by a user at the machine, but it can also always have the same value.

If a large number of short print orders are to be printed consecutively without any interruption for a copying order, the production speed will be adversely affected by the announcement times. Consequently, another embodiment of the invention is characterised in that after execution of a reproduction process in the autonomous mode, the announcement time of a reproduction process directly following thereon in the autonomous mode has a third value if a predetermined cumulative number of prints built up during a preceding uninterrupted series of reproduction processes in the autonomous mode has not been exceeded, and has a fourth value if that is the case.

In particular, the third announcement time will be much shorter than the fourth, preferably even entirely zero. In the case of a long line of short print orders, printing is in this way interrupted only very briefly or not at all, until the predetermined number of prints has been reached, after which the user again has more time to interrupt.

Another embodiment is characterised in that in response to a start command given with the aid of operating means present on the apparatus during the announcement time the announced print order is executed immediately. It may in fact be an operator's intention that his print order which has just been sent should be completed with priority. The invention offers him the possibility of this by giving him in this case the same priority as other users who go to the machine in order to start an order there.

The invention has been defined hereinbefore in relation to an apparatus provided with both a connection unit to a digital environment (network) and a scanner for independent generation of digital image data. However, the invention is not limited thereto. The invention relates to any reproduction apparatus for making prints in accordance with digital image data and capable of working either in a command-controlled mode or an autonomous mode. One example of this is an apparatus without a scanner but equipped for direct printing and the above-described postponed printing of print orders from a digital environment.

The invention will now be explained in detail with reference to the following description of a number of exemplified embodiments, with reference to the accompanying drawings.

In the drawings:

Fig. 1 is a diagram showing the general layout of an apparatus according to the invention.

Fig. 2 is a diagram of the connection unit for use in the apparatus of Fig. 1.

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Fig. 3 is a flow diagram of a process for receiving print files.

Figs. 4 and 5 are flow diagrams of a main control process according to the invention.

Fig. 6 is a flow diagram of an alternative control process.

Fig. 7 is a time diagram of a process for an actual case.

Fig. 8 is a flow diagram of an alternative control process.

Fig. 1 shows the general layout of an image reproduction apparatus according to the invention. This apparatus comprises a scanner 1 for opto-electrical scanning of a document and delivering digital image information corresponding thereto, an input unit 2 for image information from an external source, also known as the front-end, and a printing unit 3 for printing digital image information on a support material.

The scanner 1 is provided with an automatic feeder for documents for scanning (ADF) 1A, known per se, and is connected to a processing unit 17 which converts signals from the scanner into digital image data for the printing unit. The processing unit 17 is also connected to a storage unit 15 for intermediate storage of image information, which is in turn connected to the printing unit 3. The front-end 2 is also connected to the storage unit 15.

All the said elements are connected to a central control unit 18, which is also connected to an operating unit 19 provided with an operating panel 19A with keys and a display for use by an operator. The keys comprise at least one start key, a correction key, ten digit keys and a number of keys for setting copying functions, such as choice of copy format, enlargement and finishing.

The scanner 1 and the printing unit 3 are devices known per se and their construction does not form an essential part of the invention. These elements, therefore, are not described in greater detail here. A description of embodiments suitable for use in the apparatus according to the invention can be found, for example, in applicants' European Patent Application EP 0 689 157 already mentioned in the introduction.

The input unit 2 for digital image information from an external source, or the "front-end" is shown in Fig. 2. This unit is provided with a network connection unit 220, connected to an external network 16, to which, for example, a number of workstations can be coupled. These workstations can transmit data files in various generally used formats (page description languages such as PCL, PostScript, etc) via a network 16 for subsequent printing. The technique of networks and the transmission of data files thereover is general knowledge and will therefore not be explained here.

The connection unit 220 is connected to a job recognition module 222 which is in turn connected to a hard disk 223. The job recognition module 222 determines, for each data file supplied, the page description language (PDL) in which it is compiled, and extracts identification data contained therein. In network systems, data files transmitted are always provided with identification data. These data usually contain the name of the sender (owner) of the file and the name of the file itself. These data are extracted by the job recognition module 222.

The memory disc 223, which is intended for interim storage of a transmitted data file, is also connected to a PDL interpreter 224 for converting the data file coded in a page description language into a form suitable for processing by the printing unit 3. This processing is generally termed "rasterisation". The PDL interpreter 224 is connected via a buffer 225 to the storage unit 15 for interim storage. The job recognition module 222, the memory disk 223 and the PDL interpreter 224 are also each connected to the control unit 18.

A data file transmitted via the network 16 is intermediately stored on memory disk 223 by the front-end 2 and announced for printing at control unit 18. When the latter decides that the file is to be printed, it gives a command for this purpose to the PDL interpreter 224 for its rasterisation and transmission via buffer 225 to the storage unit 15. As soon as enough rasterised data have been stored therein to start printing by the printing unit 3 (e.g. sufficient for the first page for printing), the printing unit is started to make a print.

In the embodiment described here, print orders can have one of two forms, namely print orders to be printed without the intervention of an operator as soon as the printing unit is free, and printing orders which after receipt are simply stored and are printed only after selection and a starting command by an operator at the machine. The latter procedure is termed "postponed printing" in this specification. A print file is provided with an attribute which shows which of the above two categories it comes under.

A mechanism of use for postponed printing is described in applicants' European patent application EP 0 689 157. This document describes a combined copying/printing machine which either immediately prints received print files or stores them in a memory after first extracting the identity data therefrom. The identity data are entered in a list. A user whose print files are stored in this way can inspect the list of stored print files by means of the display on the operating panel of the apparatus and select one or more. By then operating the apparatus start key the operator gives the apparatus the command to print one or more selected print files.

In the following description, the term "copying" also includes the meaning "postponed printing". The common feature of both types of order is that they require the operation of keys on the apparatus operating panel.

The mechanism of copying and print management as implemented in the central control unit 18 will now be described in detail with reference to Figs. 3 to 8.

The basic idea underlying the invention is that when an machine can be used both for making copies and postponed print orders (directly at the machine) and for the autonomous printing of print files (from a worksta-

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tion), a user who takes the trouble to go to the machine must have priority for his order. The machine control process will therefore carry out autonomous print orders only if no user is present at the machine. In practice this means that the process always investigates whether there are signs to indicate that a user is engaged in carrying out an order or preparing the same at the machine. Such indications may, for example, be in the form of actuation of a key on the operating panel or the insertion of a document in the ADF feed tray. If the machine detects such indications, it will not start an incoming print order but will first wait a predetermined time. A practical value for this predetermined time would be between 30 seconds and 2 minutes. After expiry of that time the machine announces the print order on the display on the operating panel and again waits a certain predetermined time before actually starting the print order, so that a user who is present at the machine but who has not yet taken any action still has the chance of priority treatment. Moreover, if a user sees that a print order has been announced, he can have it printed with priority by actuating the machine start key. This second predetermined time would preferably be between 1 and 10 seconds. The mechanism for this is explained below.

Fig. 3 shows a process which is run to control the front-end 2 for receiving new print files from the network 16. This process contains a waiting loop which updates if a print order arrives. If this is the case, then the identity data (name of file owner and file name) are extracted from the received print file by recognition unit 222 and transmitted to the control unit 18, which enters the data in a queue and the file itself is stored on disk 223.

Figs. 4 and 5 show the main process for controlling copying and print orders. By reference to signals from the operating panel and from sensors in a number of machine parts operable by the operator, such as the ADF feed tray, step S2 checks whether an operator is performing any action at the machine and also whether a stop flag has been applied (the latter will be explained in detail hereinafter). If so, then the control reserves the machine for a copying action and any print orders are simply stored. This is clear to the operator from the fact that the operating panel display shows the notice "Ready for copying". Internally, a counter for a predetermined waiting time (hereinafter referred to as the t_W counter (this is a counter running autonomously from zero to t_W) is started (step S4). The process then checks whether the start key has been actuated on the operating panel (S6) and if so a copying process is started comprising scanning one or more documents, processing the scanner signals to printer signals and printing the copies on the basis of the printer signals (in the case of postponed printing, this step involves selection by the operator of one of the stored print files, rasterisation thereof and printing of the prints) (S8). On completion of the copying process, the process returns to step S4, in which the t_W counter is re-started.

If the start key had not been actuated in step S6, the process checks whether any other action was performed by an operator (S10). If so, the process returns to step S4 and re-starts the t_W counter. The term "other action" by the operator denotes, for example, the following: entering settings for a copying order, e.g. the number of prints required. In addition to the above-described reaction to this, the settings entered are of course included in a control process for the copying order, such process not being described here.

If it is found in step S10 that no other action of an operator has taken place, then the position of the t_W counter is detected (S12). If it has not yet reached its preprogrammed end value, the process returns to step S6. This ensures that the machine remains exclusively available for copying orders for a time t_W.

If step S12 shows that the t_W counter has reached its end value without there having been any action by an operator, then the process returns to step S2 and everything re-starts.

In the above description, the waiting time mechanism has been explained using a limited model of the apparatus functionality, namely, copying being the only command-controlled action. In actual fact, the command-controlled mode includes both copying and postponed printing as described hereinbefore, the selection of one of these two functions being made by an operator in the "operator action" detected in step S2. This "operator action" may be either selection of a "print" mode using the keys on the operating panel 19A, in which case the postponed printing function is started, or any other action, including selection of a "copy" mode, in which case the copying function is started.

If the postponed printing function is started in this way, the operator is presented with a list of all his print orders received by the front end 2, that is, both print orders of the "postponed printing" type and print orders for immediate printing. The latter print orders are added to the list, because the operator may have walked up to the machine precisely for speeding up his print orders for immediate printing. The operator may now select any of the print orders in the list, may or may not change settings of the print process, such as single or double sided printing, and may start printing by pushing the start key. In this way, the postponed printing function provides a user with the opportunity to have a print order of the type for immediate printing printed immediately at his command, given at the operating panel.

The waiting time mechanism of the postponed printing function is completely analoguous to the one of the copying function (steps S4, S6, S8, S10 and S12), and is therefore not included in the diagram of Fig.4.

If it is found in step S2 that there has been no action by an operator, and that the stop flag has not been applied, then the process checks whether a print order has arrived by inspecting the queue for entered print files (S14). If there is no print order, then the process returns to step S2. If there is a print order, then the process deals with it in accordance with the diagram of Fig. 5.

The processing of a print order starts with starting a

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counter for the announcement time, hereinafter referred to as the: t_A counter (this is a counter running autonomously from 0 to t_A), and the announcement of the first print order in the queue of the control unit 18 on the display of the operating panel by the notice "Print order starts in a few seconds", followed by the name of the owner of the print order and the name of the print file (S20). The message on the display also states that an operator can start the print order immediately by actuating the start key and can postpone the print order (so that he can himself first copy) by actuating the correction key. Any other action (actuation of a key other than the start key, insertion of documents in the ADF, even the opening of a door or flap), also results in the print order being postponed.

Step S22 then checks whether the start key has been actuated. If not, a check is made for any other action by a user at the machine (S24). If there is no such action, the position of the t_A counter is detected (S26). If it has not yet arrived at its preprogrammed end value t_A, the process returns to step S22. If t_A has been reached, the process starts the rasteriser 224 in step S28 in order to rasterise the first print file in the queue and write it to storage unit 15 via buffer 225. When sufficient rasterised data are present in the storage unit 15, the print unit 3 is started to print the image data on a sheet of paper. The print unit 3 can also be started when the rasterisation starts even though there are not sufficient image data available. Until such data are available the printing unit will run without printing. As a result the operator knows that the machine has noted his command. This is generally a good rule in digital copying or printing machines, in which the preprocessing of digital image data for printing occasionally takes some time. If the machine remains stationary after actuation of the start key, because there is only processing of image data first of all, the operator does not know whether the machine has recognised his order.

If it was found in step S22 that the start key had been actuated, then there was an immediate transition to step S28. If it is found in step S24 that some other action was carried out, then the preparation of the print order is discontinued. The announcement message is removed from the display, the t_A counter is stopped and reset (S30) and the process skips to S4 (Fig. 4) to give the operator the opportunity of carrying out a copying order.

During the printing of a print order (started in step S28), the following message is displayed on the control panel display: "Busy with print order", followed by the name of the owner of the print order and the name of the print file. Furthermore, there is a continual check whether an operator has made his presence known by some action at the machine (S32). If this is the case, the process applies a stop flag to a specific place in the memory (S34), but does not interrupt the running print order. Since the stop flag has been applied, preparation for any new print order will not immediately be started after completion of the print order, and instead the machine first becomes available for a copying order. On completion of the print order (S36) the process returns to step S2, in which, inter alia, the stop flag is inspected.

A second embodiment of the invention comprising an alternative treatment of a print order is shown in Fig. 6. Here, rasterisation of a print file for printing and the writing of the rasterised image data to the storage unit 15 are already started at the start of the announcement time t_A, so that usually there will be sufficient image data for the print unit on completion thereof and hence printing can start immediately. If, during the announcement time, an operator interrupts the process in order to make one or more copies, then the image data already rasterised stay in the storage unit unless there is insufficient memory space available for the copying order. In that case, the image data already rasterised are erased from the storage unit and on completion of the interruption rasterisation must restart completely or partially. In the other case, rasterisation can proceed as usual when the data flow to the storage unit 15 for the copying order has been completed. Naturally printing of the print order does not start until expiry of the waiting time t_W. The machine can also be equipped with two separate memories, one for copying processes and one for print orders, so that in the event of interruption of a print order for a copying order the rasterised image data can be safely stored.

In Fig. 6, those steps which coincide with the steps in Fig. 5 are indicated by the same serial number and the prime sign. The sequence of the process according to this embodiment differs primarily from that of Fig. 5 by the addition of a step S25' between the steps S24' and S26' and a step S23' in the direct connection between S22' and S28'. The two added steps check whether there are sufficient rasterised image data available in storage unit 15 for printing to start. If this is not the case, the process skips from step S25' back to step S22', or else the process in step S23' waits until the rasterisation is completed.

Fig. 7 describes the procedure in the event of mixed use of the machine according to the invention as a printer and copying machine for an actual situation.

Along the bottom of the Figure a time scale is shown with arbitrary time units which will be used hereinafter to indicate consecutive events. For this example, the waiting time t_W is set at three time units and the announcement time t_A at two time units. The continuous line with blocks therein in the middle of the drawing shows the sequence of activities of the machine in the course of time. A block represents a copying or print action. In relation to the two alternative embodiments described above, a "Print" block denotes either rasterisation and printing of the rasterised image data (the first embodiment) or just printing, in which case rasterisation has already taken place in the announcement time t_A (second embodiment). The latter is not shown separately in the drawing.

Let it be assumed that a copying order starts at a time $t = 0$. This is completed at time $t = 8$, whereafter the

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counter is started for the waiting time t_W. This runs to t = 11. In the meantime, at time t = 9 a print order has arrived in the front-end 2, which has reported it to central control unit 18 and has stored the associated print file (print file 1) on storage unit 223.

Since there is therefore a print order present at the end of t_W, the counter is now started for the announcement time t_A and the announcement message with the name of the user and the print file is displayed on the display. Nothing has happened at the expiry of t_A and hence the process now gives the front-end 2 the command to rasterise the print file 1 and to store the resulting image data in the storage unit 15, and gives the printing unit 3 the command to print the image data.

The printing unit finishes this at time t = 19, but in the meantime a new print order has arrived at t = 16 and has been stored by front-end 2 on disk 223 (print file 2). On the completion of the printing of print file 1, the counter for t_A is then immediately re-started and the new print order is announced on the screen. On expiry of t_A there has again been no action and hence the process orders the front-end 2 to rasterise print file 2 and to store the image data thus generated in the set memory 15, and orders the printing unit 3 to print the image data.

A new print order has arrived and been stored (at t = 23) during the printing of print file 2 also, and on completion of the printing the counter for t_A is re-started, but before this expires a perceptible action is carried out by a user at the machine at time t = 28, e.g. the insertion of a stack of documents in the ADF feed tray. Consequently, at the same time, the counter for t_A is stopped and the counter for the waiting time t_W is started so that the machine is now exclusively available for a copying order for some time. The announcement of the print order is removed from the display and replaced by the message "ready for copying".

At the time t = 29 the operator has made the required settings for his copying order and actuates the start key, whereupon the machine performs the copying order. This is finished at time t = 36, after which the counter is started for the waiting time t_W in order to give the operator the opportunity of giving any subsequent copying order. However, the operator is finished, removes his documents and copies from the trays and leaves the machine without any further action. As a result, t_W runs undisturbedly and the process starts with the preparations for printing print file 3 by starting the counter for the announcement time t_A and showing on the display the announcement message with the name of the user and the print file. On expiry of t_A, at t = 41, the actual printing action is started.

Fig. 8 shows a third embodiment of the invention. This embodiment is a variant of the above-described second embodiment shown in Fig. 6, and offers a further increase in printing speed, particularly if a number of small print orders are fed to the machine successively. In the said second embodiment, two print orders received shortly after one another are always printed with an interval t_A. If very small print orders are to be executed, the time required for their printing will be small with respect to the interim time t_A, and the total production time for all the print orders will be determined primarily by the intermediate times, so that the average print speed drops. This is greatly improved in the third embodiment described hereinafter. To this end, after the printing of a print file, the printing of the next print file is immediately started until the cumulative number of printed sheets of the series of print files exceeds a predetermined number, e.g. 30. Only in that latter case is an announcement intercalated with the interim time t_A.

Other criteria can also be used to effect the interruption for a new announcement, e.g. if a predetermined number of digital data are exceeded, or the interruption is to be possible if a print file of another owner has to be printed.

In Fig. 8, those steps which coincide with the steps in Fig. 6 are indicated by the same serial number and a double prime.

The rasterisation of print files (step S20") is now not restricted to the first print file in the queue, but continues until there are no more print files in the queue or there is an interruption to the process. While the rasterisation is in progress, the t_A counter runs and the first print order is announced on the display. In the meantime, an operator can start the printing earlier by actuating the start key (S22"), so that printing starts as soon as the first print file has been sufficiently rasterised (S23" and S28"). Any other action by the operator (S24") causes rasterisation to be interrupted, the t_A counter to be stopped and any built-up cumulative number of printed sheets is zeroed (S30" and S31"), whereafter the process returns to the copying mode.

When a print file has been rasterised (S25"), and the t_A-counter has also expired (S26"), the printing unit 2 is started for printing said print file (S28") and as long as this is not the case the process will continue to follow the operator's actions.

During printing the display shows the message "Busy printing print order", followed the name of the owner of the print order and the name of the print file, and also: "Press C for copying order". The process then continues to check operator's actions (S32") and applies a stop flag on recognition thereof.

On completion of a print order (S36"), the number of printed sheets is added to any total already built up (S38"), whereupon step S40" checks whether this results in the predetermined maximum number of pages (N) being exceeded. If this is the case, then the built-up cumulative number of printed sheets is returned to zero (S42") and the process skips back to step S2, so that an announcement is again made.

If the number N is not exceeded in step S40", a check is first made whether the stop flag has been applied as a result of an operator's action (S44"). If that is the case, the process skips to the copying mode via steps S30" and S31". If no stop flag has been applied, then in step S25" the process checks whether a following print file has already been rasterised and if so it pro-

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ceeds to print the same. The t_A counter had already expired, so that step S26" has no significance in this case.

In this way a number of small print orders can be processed rapidly, while still guaranteeing priority for a copying order.

As an addition to the above-described embodiments, the process can be extended in such manner that on receipt of a print order by the front-end 2 a message is shown on the operating panel display to indicate the arrival together with the extracted identity data of the received print order. In addition, the message states that this print order can be started immediately by actuating a specific key. After expiry of a predetermined time or by actuating another specific key the message disappears from the display. This is convenient for a user who wants to print a print file quickly, because after transmitting the print file he can immediately proceed to the machine and can start the print order there without having to await the waiting time or announcement time.

A special form of command-controlled mode is the priority printing of an ordinary print order when a queue of print orders has arisen as a result of a large inflow of print orders. These print orders are included in the queue in order of arrival. In known networking systems it is possible to inspect the queue. This possibility is also incorporated in the apparatus according to the invention, in which inspection takes place by means of the display on the operating panel. Using the keys on the operating panel a user can now select a print order from the queue. According to the principle of the invention, this action of the machine is also dealt with as a copying or postponed print order, i.e. in accordance with steps S2 to S12 (with of course an appropriate text being shown in step S4).

Although the invention has been described with reference to the embodiments above, it is not restricted thereto. It will be clear to the skilled person that other embodiments are possible within the scope of the claims.

Claims

1. A method of controlling a digital reproduction apparatus adapted to make prints, in accordance with digital image data, on image supports, such as sheets of paper, either in a command-controlled mode in which the apparatus starts a reproduction process in response to a start command given with the aid of operating means present on the apparatus, or an autonomous mode in which the apparatus starts a reproduction process on its own initiative, the autonomous mode being automatically set in dependence on a print order received from a digital environment, characterised in that when the autonomous mode is set for carrying out a received print order, first a predetermined announcement time is awaited, during which announcement time
   - an announcement is given, in a manner which can be recognised by the physical environment of the apparatus, that the said print order is to be carried out, and
   - in response to one or more specific physical interactions between the operator and the apparatus the apparatus is returned to the command-controlled mode,

   and that the print order is actually executed only after expiry of the said announcement time.

2. A method according to claim 1, wherein said specific physical interactions include any machine-detectable interaction related to the execution of a reproduction process in the command-controlled mode, except one or more predetermined specific physical interactions.

3. A method according to claim 1, wherein the announcement of a print order is effected in the form of an announcement message on a display screen provided on the apparatus.

4. A method according to claim 1 or 3, wherein in the announcement of a print order an identification is given of the print order for execution.

5. A method according to claim 1, wherein when one or more specific physical interactions between an operator and the apparatus are detected, the apparatus is brought into the command-controlled mode and is kept therein for a predetermined first waiting time.

6. A method according to claim 5, wherein said specific physical interactions include any machine-detectable interaction related to the execution of a reproduction process in the command-controlled mode, except one or more predetermined specific physical interactions.

7. A method according to claim 5, characterised in that if a print order is received a check is made as to whether the apparatus is in the said first waiting time and that the autonomous mode is set only if this is not the case.

8. A method according to claim 1 or 5, wherein on completion of the execution of a reproduction process in the command-controlled mode the apparatus is kept in the command-controlled mode for a predetermined second waiting time.

9. A method according to claim 8, characterised in that if a print order is received a check is made whether the apparatus is in the said second waiting time, and in that the autonomous mode is set only if this is not the case.

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10. A method according to claim 8, characterised in that the said announcement time has a first value if it directly follows expiry of a first or a second waiting time, and has a second value if it follows directly on the execution of a reproduction process in the autonomous mode.

11. A method according to claim 1, characterised in that after execution of a reproduction process in the autonomous mode, the announcement time of a reproduction process directly following thereon in the autonomous mode has a third value if a predetermined cumulative number of prints built up during a preceding uninterrupted series of reproduction processes in the autonomous mode has not been exceeded, and has a fourth value if that is the case.

12. A method according to claim 1, characterised in that in response to a start command given with the aid of operating means present on the apparatus during the announcement time the announced print order is executed immediately.

13. A method according to claim 1, wherein the reproduction process in the said command-controlled mode comprises a copying process, wherein digital image data are generated by a scanner belonging to the apparatus and are printed on image supports, if required after processing and intermediate storage.

14. A method according to claim 1, wherein the reproduction process in the said command-controlled mode comprises a postponed printing process for the execution of print orders received from a digital environment, wherein execution of a received print order can be started only in response to operation of one or more operating means on the apparatus.

15. A method according to claim 1, wherein the reproduction process in the said command-controlled mode forms a combination of selection of a print order from a queue of print orders received from a digital environment and the execution of the selected print order.

16. A method of controlling a digital reproduction apparatus adapted to make prints, in accordance with digital image data, on image supports, such as sheets of paper, either in a command-controlled mode in which the apparatus starts a reproduction process in response to a start command given with the aid of operating means present on the apparatus, or an autonomous mode in which the apparatus starts a reproduction process on its own initiative, the autonomous mode being automatically set in dependence on a print order received from a digital environment, which apparatus is provided with means for detecting a physical interaction between an operator and the apparatus, characterised in that
on detection of one or more specific physical interactions between an operator and the apparatus the apparatus is brought into the command-controlled mode and is kept therein for a predetermined first waiting time.

17. A method according to claim 16, wherein said specific physical interactions include any machine-detectable interaction related to the execution of a reproduction process in the command-controlled mode, except one or more predetermined specific physical interactions.

18. A method according to claim 16, characterised in that if a print order is received a check is made whether the apparatus is in the said first waiting time, and in that the autonomous mode is set only if that is not the case.

19. A method according to claim 16, wherein on completion of the execution of a reproduction process in the command-controlled mode the apparatus is kept in the command-controlled mode for a predetermined second waiting time.

20. A method according to claim 19, characterised in that if a print order is received a check is made whether the apparatus is in the said second waiting time, and in that the autonomous mode is set only if this is not the case.

21. A method according to claim 16, wherein the reproduction process in the said command-controlled mode comprises a copying process, wherein digital image data are generated by a scanner belonging to the apparatus and are printed on image supports, if required after processing and intermediate storage.

22. A method according to claim 16, wherein the reproduction process in the said command-controlled mode comprises a postponed printing process for the execution of print orders received from a digital environment, wherein execution of a received print order can be started only in response to operation of one or more operating means on the apparatus.

23. A method according to claim 16, wherein the reproduction process in the said command-controlled mode forms a combination of selection of a print order from a queue of print orders received from a digital environment and the execution of the selected print order.

24. Apparatus for reproducing images on image supports, such as sheets of paper, comprising

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a generator for generating digital image information, at least comprising a connection unit for receiving and processing digital image information from a digital environment;
a printing unit for printing an image on a image support in accordance with digital image information;
an operating unit provided with operating means such as keys and a display screen;
a control unit connected to the connection unit, the printer unit and the operating unit, for controlling the apparatus in
either a command-controlled mode in which the control unit in response to a start command given by the operating means starts a reproduction process in the apparatus,
or an autonomous mode in which the control unit starts a reproduction process in the apparatus on its own initiative,
said control unit being provided with means for checking whether a print order has been received by the connection unit from a digital environment and, in dependence thereon, automatically setting the autonomous mode,
said control unit also being provided with means for detecting physical interactions between an operator and the apparatus,
characterised in that
the control unit is further provided with a first time counter for counting a predetermined announcement time and announcement means for announcing, in a manner recognisable by the physical environment of the apparatus, that a received print order is to be executed,
and also in that the control unit is so adapted
that when the autonomous mode is set for the execution of a print order received by the connection unit
it first starts the first time counter and activates the means for announcing a print order;
it responds, during the announcement time, to one or more specific physical interactions between an operator and the apparatus by returning to the command-controlled mode;
and it starts a reproduction process for executing the associated print order only on expiry of the said announcement time.

25. Apparatus according to claim 24, wherein said specific physical interactions include any machine-detectable interaction related to the execution of a reproduction process in the command-controlled mode, except one or more predetermined specific physical interactions.

26. Apparatus according to claim 24, wherein the announcement means are adapted to show an announcement message on the operating unit display screen.

27. Apparatus according to claim 24 or 26, wherein the announcement means are adapted, on announcement of a print order, to reproduce an identification thereof.

28. Apparatus according to claim 24, characterised in that

the control unit is provided with a second time counter adapted to count a predetermined first waiting time,
and also in that the control unit is so adapted, on detecting one or more physical interactions between an operator and the apparatus, as to proceed to or remain in the command-controlled mode, start the second time counter, and remain in the command-controlled mode during the said first waiting time.

29. Apparatus according to claim 28, wherein said specific physical interactions include any machine-detectable interaction related to the execution of a reproduction process in the command-controlled mode, except one or more predetermined specific physical interactions.

30. Apparatus according to claim 28, characterised in that the control unit is so adapted, if a print order is received by the connection unit, as not to proceed to the autonomous mode if the second time counter is running.

31. Apparatus according to claim 24 or 28, characterised in that the control unit is provided with a third time counter adapted to count a predetermined second waiting time,
and also in that the control unit is so adapted, on completion of the execution of a reproduction process in the command-controlled mode, as to activate the third time counter and remain in the command-controlled mode for the said second waiting time.

32. Apparatus according to claim 31, characterised in that the control unit is so adapted, if a print order is received by the connection unit, as not to proceed to the autonomous mode if the second or third time counter is running.

33. Apparatus according to claim 24, characterised in that the said announcement time has a first value after expiry of a first or second waiting time, and has a second value directly after execution of the print order.

34. Apparatus according to claim 24, wherein the control unit is also provided with a counter for updating a cumulative number of prints built up during the

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execution of print orders, and wherein the said announcement time after execution of a print order has a third value if at that time the said counter has not yet reached a predetermined value, and has a fourth value if that is the case.

35. Apparatus according to claim 34, wherein the control unit is so adapted, in response to a start command given with the aid of the operating means during the announcement time, as to immediately start up a reproduction process for the announced print order.

36. Apparatus for reproducing images on image supports, such as sheets of paper, comprising

a generator for generating digital image information, at least comprising a connection unit for receiving and processing digital image information from a digital environment;
a printing unit for printing an image on a image support in accordance with digital image information;
an operating unit provided with operating means such as keys and a display screen;
a control unit connected to the connection unit, the printer unit and the operating unit, for controlling the apparatus in
either a command-controlled mode in which the control unit in response to a start command given by the operating means starts a reproduction process in the apparatus,
or an autonomous mode in which the control unit starts a reproduction process in the apparatus on its own initiative,
wherein the control unit is provided with means for checking whether a print order has been received by the connection unit from a digital environment and, in dependence thereon, automatically setting the autonomous mode, and also provided with means for detecting a physical interaction between an operator and the apparatus,
characterised in that
the control unit is provided with a second time counter adapted to count a predetermined first waiting time,
and also in that the control unit is so adapted, on detection of one or more physical interactions between an operator and the apparatus, as to proceed to or remain in the command-controlled mode, start the second time counter and remain in the command-controlled mode during the said first waiting time.

37. Apparatus according to claim 36, wherein said specific physical interactions include any machine-detectable interaction related to the execution of a reproduction process in the command-controlled mode, except one or more predetermined specific physical interactions.

38. Apparatus according to claim 36, characterised in that the control unit is so adapted, if a print order is received by the connection unit, as not to proceed to the autonomous mode if the second time counter is running.

39. Apparatus according to claim 36, characterised in that the control unit is provided with a third time counter adapted to count a predetermined second waiting time,
and also in that the control unit is so adapted, on completion of the execution of a reproduction process in the command-controlled mode, as to activate the third time counter and remain in the command-controlled mode for the said second waiting time.

40. Apparatus according to claim 39, characterised in that the control unit is so adapted, if a print order is received by the connection unit, as not to proceed to the autonomous mode if the second or third time counter is running.

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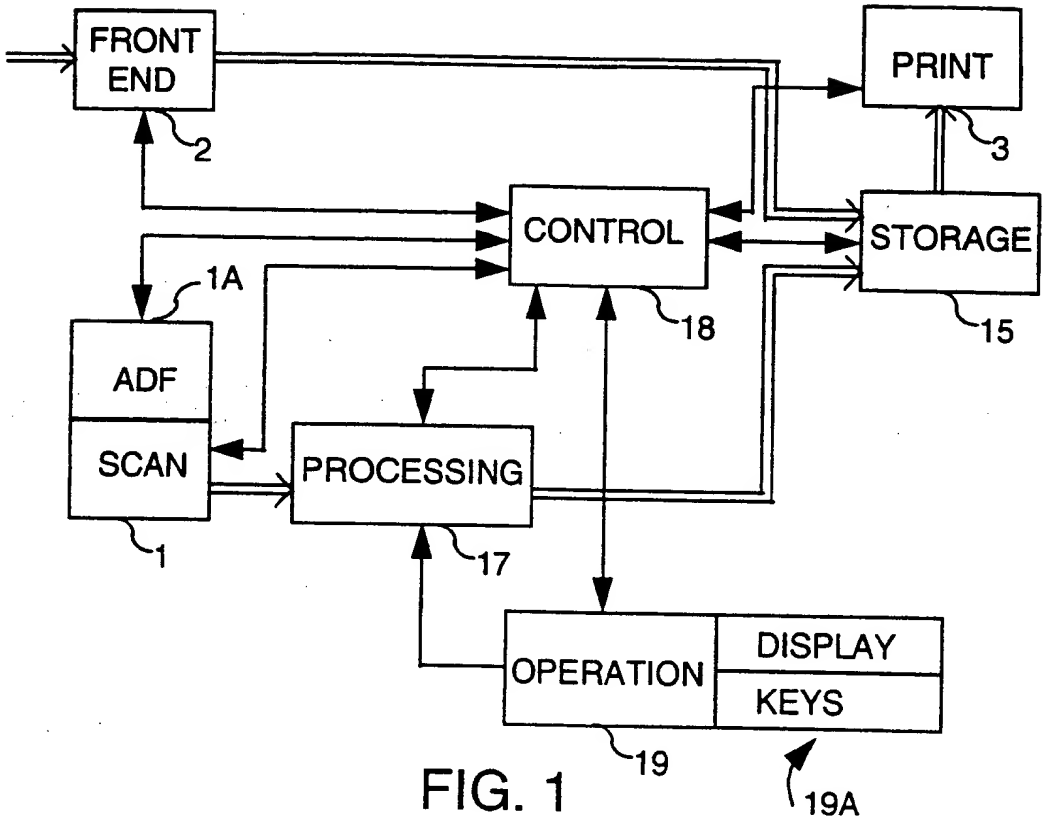

FIG. 1

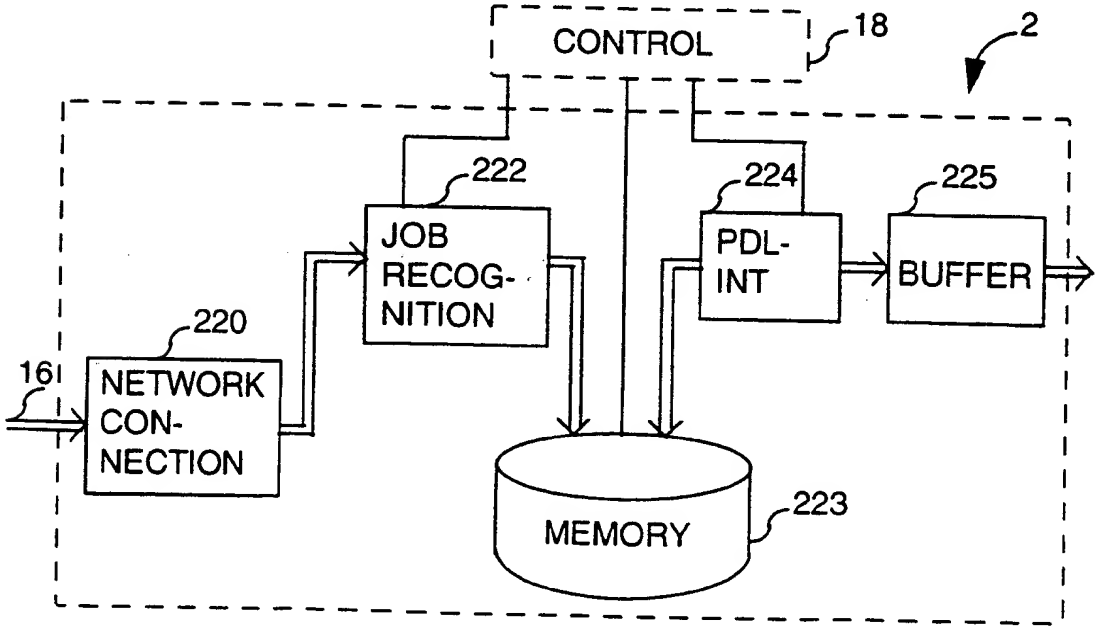

FIG. 2

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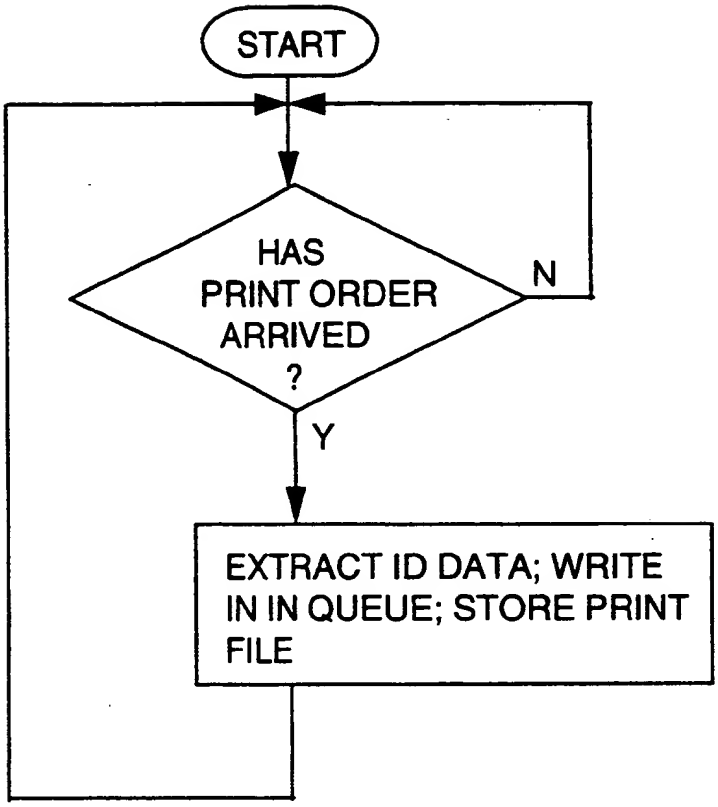

FIG. 3

BNSDOCID: <EP_____0814424A1_I_>

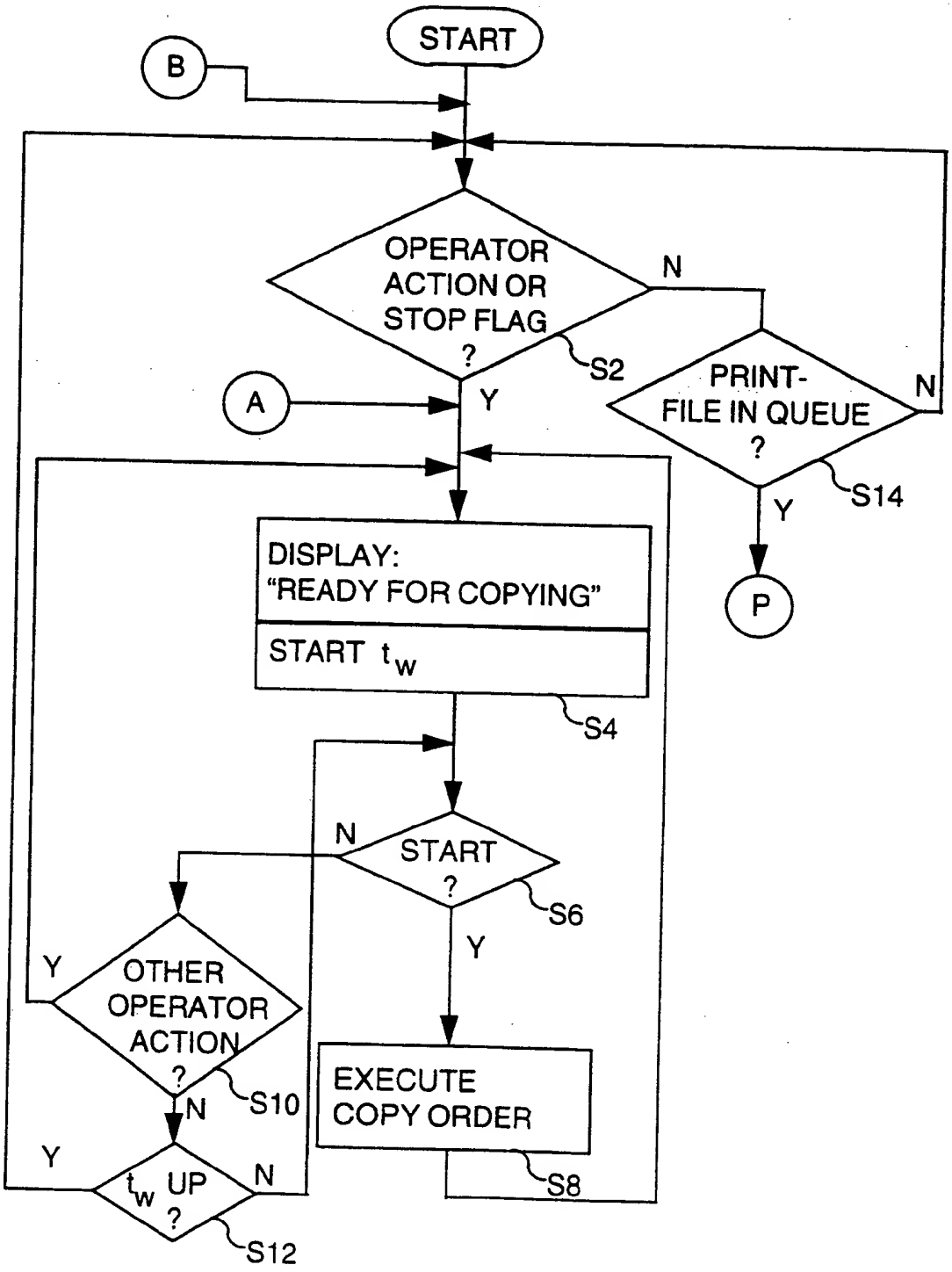

FIG. 4

BNSDOCID: <EP_____0814424A1_I_>

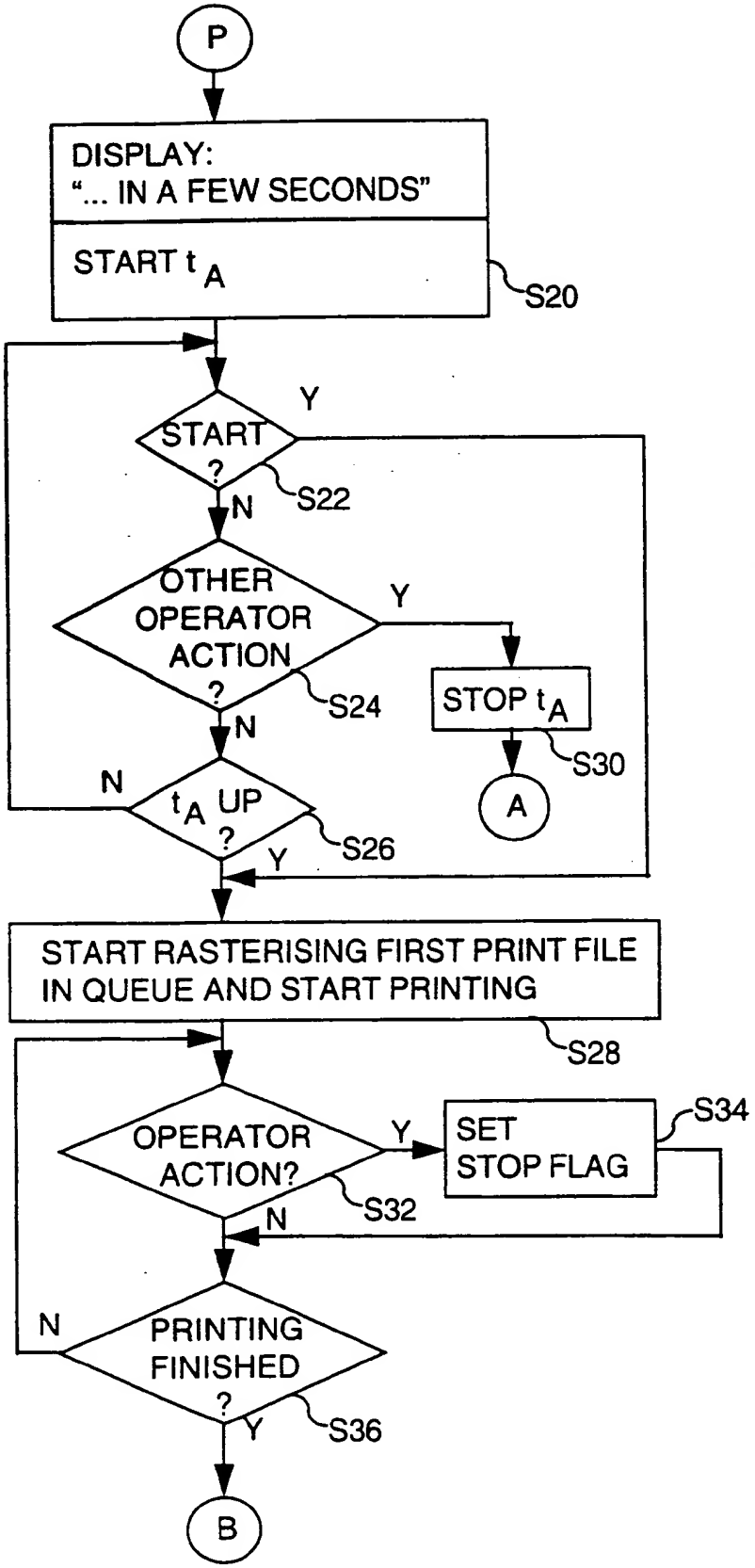

FIG. 5

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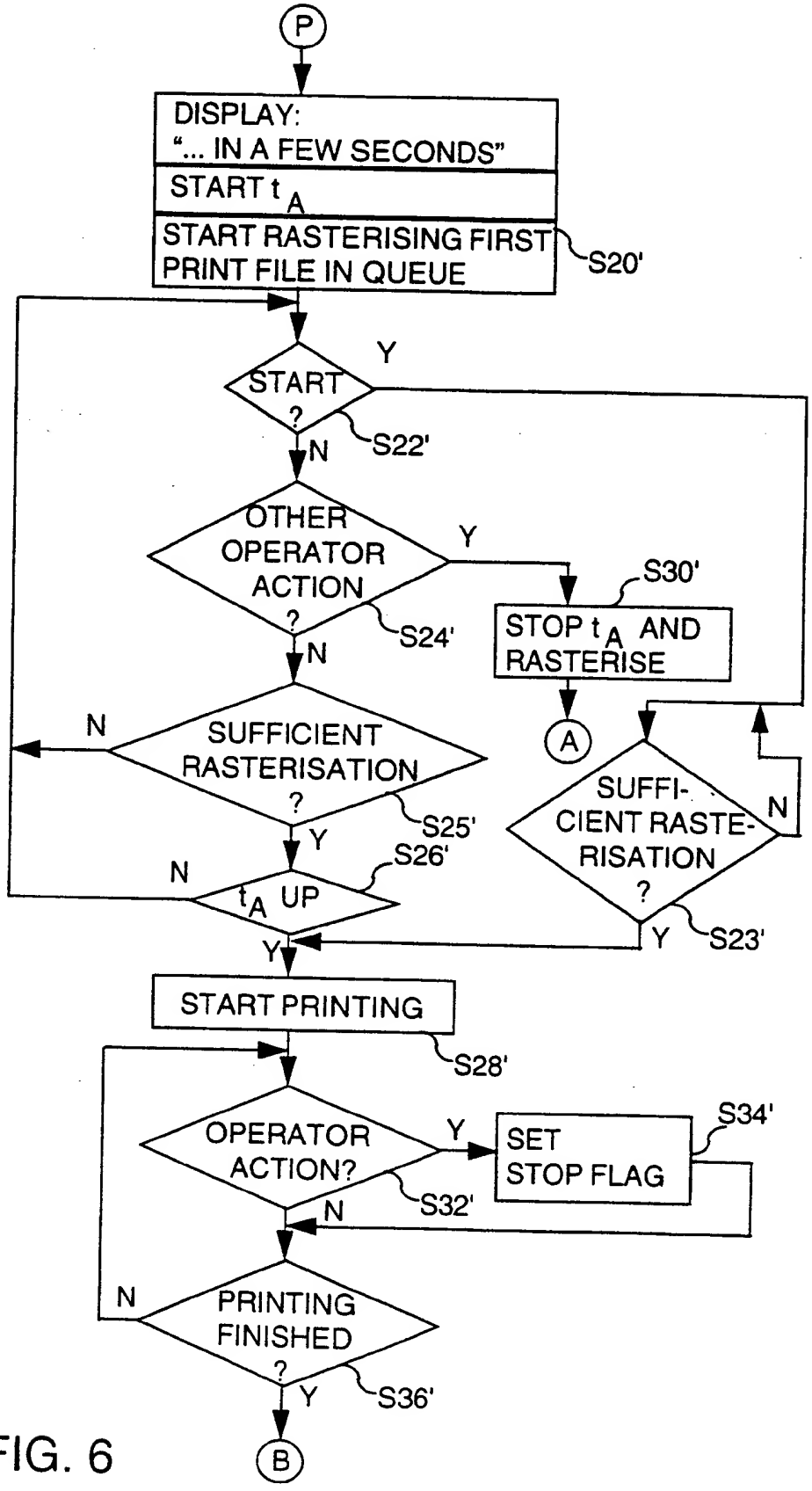

FIG. 6

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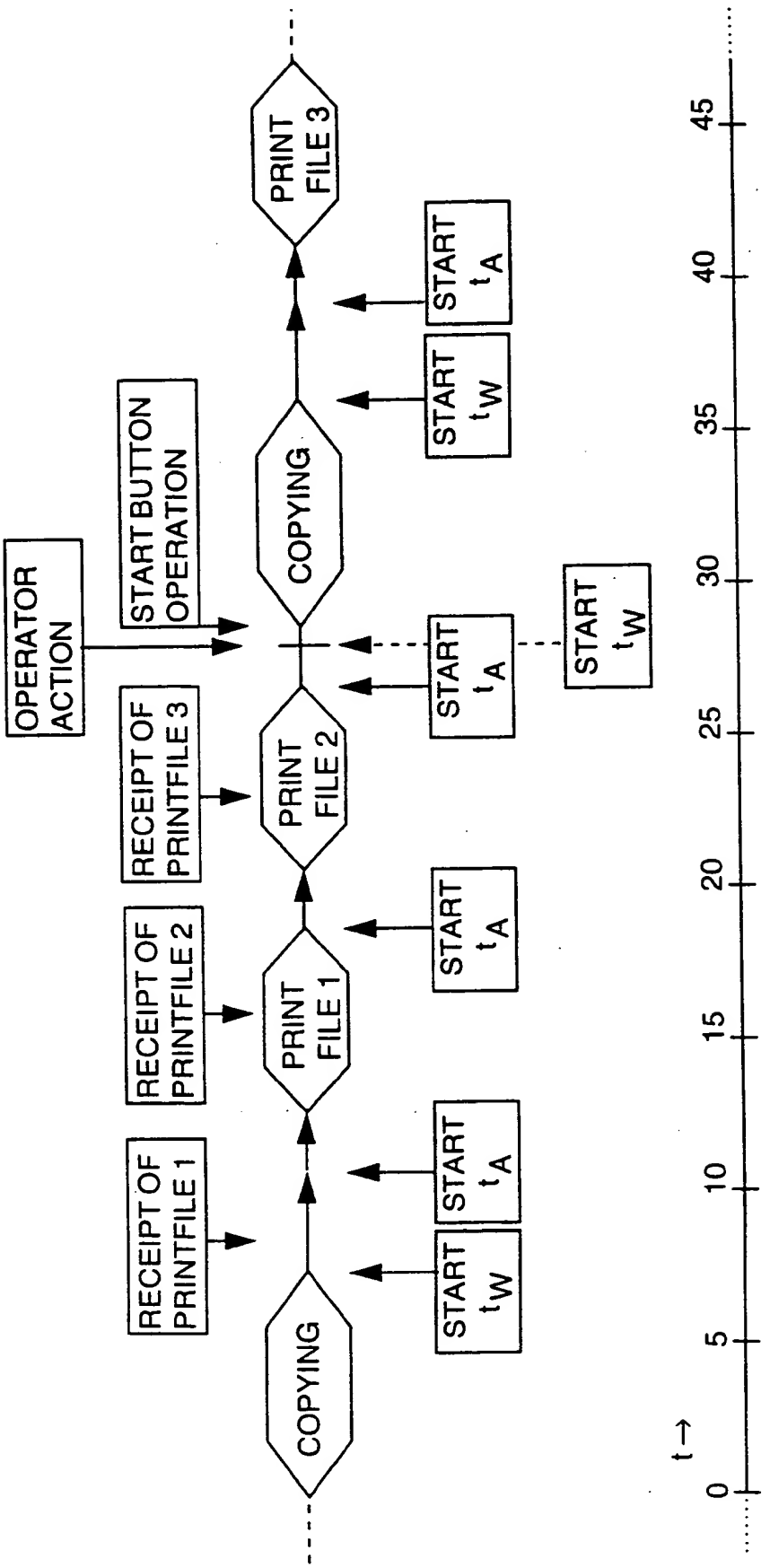

FIG. 7

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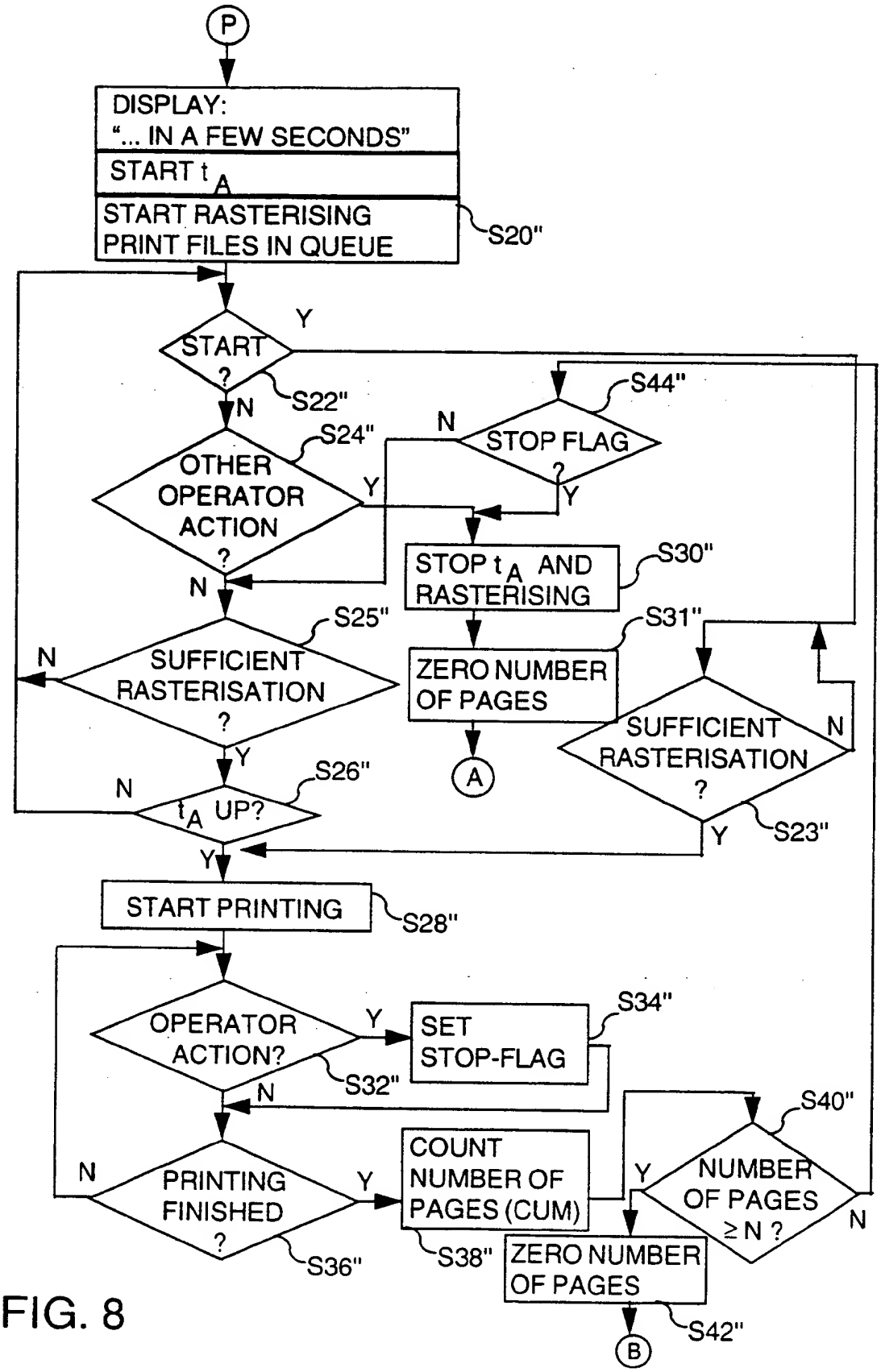

FIG. 8

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European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 20 1757

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	EP 0 291 777 A (RICOH KK) 23 November 1988 * column 12, line 36 - column 14, line 13 * * column 22, line 13 - column 25, line 26; figures 12,13 *	1-40	G06K15/00 H04N1/32
A	EP 0 499 719 A (OCE NEDERLAND BV) 26 August 1992 * column 3, line 12 - column 5, line 27 *	1,16,24, 36	
A	PATENT ABSTRACTS OF JAPAN vol. 014, no. 511 (E-0999), 8 November 1990 & JP 02 211764 A (RICOH CO LTD), 23 August 1990, * abstract *	1,16,24, 36	
A	EP 0 689 157 A (OCE NEDERLAND BV) 27 December 1995		

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

G06K
H04N

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	24 September 1997	Gélébart, Y

CATEGORY OF CITED DOCUMENTS

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